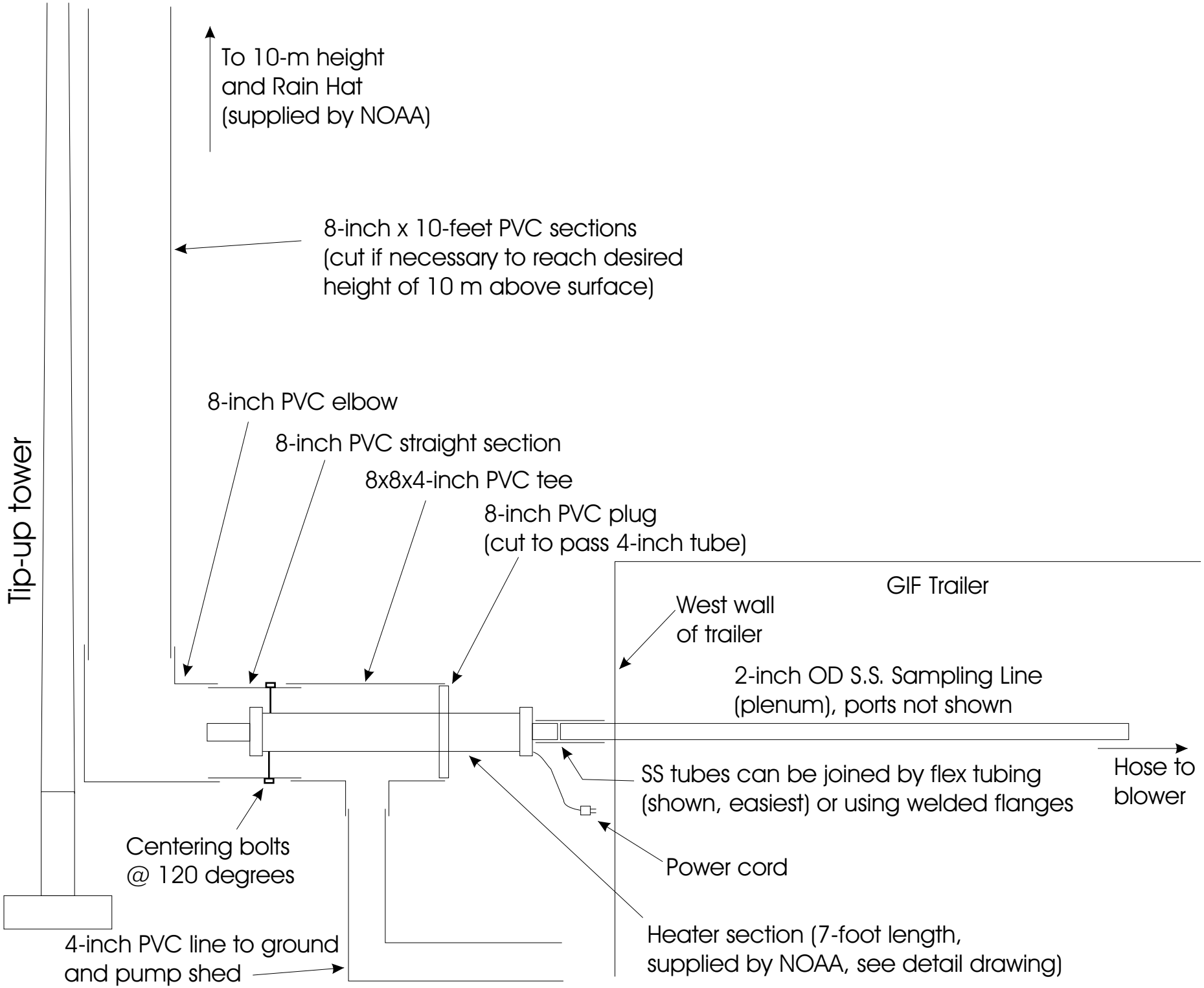
To 10-m height
and Rain Hat
(supplied by NOAA)
8-inch x 10-feet PVC sections
(cut if necessary to reach desired
height of 10 m above surface)
8-inch PVC elbow
8-inch PVC straight section
8x8x4-inch PVC tee
8-inch PVC plug
(cut to pass 4-inch tube)
Tip-up tower
GIF Trailer
West wall
of trailer
2-inch OD S.S. Sampling Line
(plenum), ports not shown
Hose to
blower
SS tubes can be joined by flex tubing
(shown, easiest) or using welded flanges
Centering bolts
@ 120 degrees
Power cord
Heater section (7-foot length,
supplied by NOAA, see detail drawing)
4-inch PVC line to ground
and pump shed

Notes to Schematic prepared by Pat Sheridan (patrick.sheridan@noaa.gov) 2-21-03

Attached is a detailed schematic of the proposed aerosol stack. Comments on its design and functionality are requested.

As indicated in the drawing, NOAA will provide the stack rain hat and the 7-foot heater section. FYI, the heater can draw as much as 600W of 120VAC, but it is operated in a pulsed mode so it doesn't get the tube very hot. The heater will only heat until the airstream reaches 40 deg. C.

We also have a thermal cutoff switch (50 deg. C) built in, so a runaway heater won't happen. We will also provide the heater controller and sensors for monitoring sample line T and RH.

The key points I can think of are listed below:

1) The top of the stack should be at ~10 meters above ground level. You can cut the 10-foot sections of 8" pvc pipe until you get to the right height.

2) I have shown elbows as sharp 90-deg turns. That's faster than actually drawing curves in Corel Draw. Just be aware that the elbows you get will be rounded. The front end of the sampling tube extending forward from the heater is set back from the elbow by perhaps 1 to 1.5 feet. The velocity of air coming down the stack is low so we are not concerned about large particles being able to make that 90-degree turn in a tube that of that diameter.

3) The overall length of the heater section is ~7 feet. The length of the 8" pvc straight section and the amount that the heater section is sticking out of the 8" pvc tee can be chosen so that the stack is ~10 feet awat from the wall of the trailer. I will send you a detail drawing of the heater section later today.

4) The 8" pvc flat plug (or flat cap, whichever you prefer) at the end of the pvc tee needs to have a 4" round hole cut in it so that the heater can slide through. Probably the best thing would be for you, after you obtain the pvc pieces, to send the end plug to me so we can cut it exactly the right size. We have the proper hole saw to cut the plug.

5) There are 3 centering bolts that are used to keep the heater section in the center of the air stream. These are a minimum of 3/8" hardware, but they could be larger (7/16" or 1/2"). You need to drill and tap three holes and then turn the bolts through.

6) I have shown a 4" pvc line leaving the tee and going to the pump shed. This line dumps the excess stack air that is not sampled. This line can be constructed with PVC slip fit pieces (straight sections and an elbow). We usually run our dump line to our blower along the ground, but you can do it however you think will work best. If you could run this 4" tube through the wall of the pump shed, we will connect up to it. We will probably neck down at this point to a 2" flex line so we can get it into our blower.

We want to keep the ID of the dump line as large as possible for as long as possible so that we can reach our desired flow. A 2" line all the way from tee to pump shed would have too much frictional flow loss to be useful. We will provide the blower, pitot tube sensor, delta-P gauge, 2" tubing, clamps, etc., to connect the 4" pvc dump line to our blower.

7) Another blower is also required to move air through the 2" stainless steel heater tube and sampling line (plenum). We will provide this blower and associated tubing. Note that the sampling ports on the plenum inside the trailer are not shown yet. We need to discuss options for these ports, so I recommend a telephone discussion very soon.

8) The heater section and the sampling line are both 2" OD stainless steel tubes that need to be joined somehow. I showed in the drawing that 2" ID flexible hose could be used, as long as it was securely clamped and insulated. Alternatively, you could have machined flanges (w/o-ring grooves) welded onto the ends of both tubes, but this is more expensive and the other way will probably work fine.

9) The stack will have to be built so that it can be raised and lowered occasionally. That means that one of the pvc pipe connections should not be sealed so that we can pull it apart. This connection should probably be at either end of the 8" pvc straight section.

10) That's all I can think of to explain! I undoubtedly have forgotten something, so please email me with questions or comments.